

## New source of MeV negative ion and neutral atom beams

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Negative ions play a major role in a number of areas of physics and chemistry, for high current tandem accelerators, ion beam microscopy and lithography. Nowadays the neutral atoms are considered essential in the fusion experiments for additional heating of the plasma. The way to generate neutral atom beams is to produce a positive and negative ions, to accelerate them and then to neutralise. However, the efficiency is very low.

Additionally, there is a *strong fundamental interest* in negative ions: here in screening of nucleus the inter-electronic interactions become relatively more important than the electron-nuclear interactions. In the interplay of these attractive and repulsive interactions the electron correlation plays an important role.

After reviewing the relevant theoretical and experimental background on negative ion acceleration mechanisms this presentation will discuss the results of recent experiments where energetic ( $\sim$ MeV energies) negative ion and neutral atom beams have been generated at the passage of energetic positive ions through a liquid spray. We are demonstrating the efficient production of negative ions and neutral atom beams from MeV positive ions in the electron capture and loss processes, where the energy and momentum of the projectile is preserved. The process is rather general and different negative ions and neutral atom beams can be generated.

We will discuss the physical aspects of the phenomena and open problems. At the moment we do not have clear explanation, but it is suggestive that the processes are more complex than the considered single electron capture and loss, or the shell effects in the electronic structure of the projectile ion and/or target atoms may influence the probabilities.

Substantial work would be required for sophisticated model analyses in order to better understand the dynamics involved in the electron transfer processes.